



6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 1042

[EPA-HQ-OAR-2018-0638; FRL-10013-36-OAR]

RIN 2060-AU30

Amendments Related to Marine Diesel Engine Emission Standards

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is amending the national marine diesel engine program with relief provisions to address concerns associated with finding and installing certified Tier 4 marine diesel engines in certain high-speed commercial vessels. This relief is in the form of additional lead time for qualifying engines and vessels.

DATES: This final rule is effective on **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA-HQ-OAR-2018-0638. All documents in the docket are listed on the www.regulations.gov web site. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically in www.regulations.gov or in hard copy at Air and Radiation Docket and Information Center, EPA Docket Center, EPA/DC, EPA WJC West Building, 1301 Constitution Ave., N.W., Room 3334, Washington, DC. Note that the EPA Docket Center and Reading Room were closed to public visitors on March 31,

2020, to reduce the risk of transmitting COVID-19. The Docket Center staff will continue to provide remote customer service via email, phone, and webform. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566-1742. For further information on EPA Docket Center services and the current status, go to <https://www.epa.gov/dockets>.

FOR FURTHER INFORMATION CONTACT: Alan Stout, Office of Transportation and Air Quality, Assessment and Standards Division (ASD), Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105; telephone number: (734) 214-4805; email address: stout.alan@epa.gov.

SUPPLEMENTARY INFORMATION:

Does This Action Apply to Me?

This action relates to marine diesel engines with rated power between 600 and 1,400 kW intended for installation on vessels flagged or registered in the United States, vessels that use those engines, and companies that manufacture, repair, or rebuild those engines and vessels.

Categories and business entities that might be affected by this rule include the following:

Category	NAICS Code ^a	Examples of Potentially Affected Entities
Industry	333618	Marine engine manufacturing
Industry	336611	Shipbuilding and repairing

^a North American Industry Classification System (NAICS).

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely covered by these rules. This table lists the types of entities that we are aware may be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your activities are regulated by this action, you should carefully examine the applicability criteria in the referenced regulations. You may direct questions regarding the

applicability of this action to the persons listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

I. Summary

EPA's 2008 Final Rule for Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder adopted Tier 4 emission standards for commercial marine diesel engines at or above 600 kilowatts (kW) (73 FR 37096, June 30, 2008). These standards, which were expected to require the use of exhaust aftertreatment technology, phased in from 2014 to 2017, depending on engine power.¹ After the Tier 4 standards were fully in effect for all engine sizes, some boat builders informed EPA that there were no certified Tier 4 engines available with suitable performance characteristics for the vessels they needed to build, specifically for high-speed commercial vessels that rely on engines with rated power between 600 and 1,400 kW that have high power density.

To address these concerns, EPA proposed, and through this rule is adopting, provisions to provide additional lead time for implementing the Tier 4 standards for engines used in certain high-speed vessels (84 FR 46909, September 6, 2019). We are also finalizing the proposed approaches for streamlining certification requirements to facilitate or accelerate certification of Tier 4 marine engines with high power density. These changes are reflected in amendments to 40 CFR. 1042.145, 1042.505, and 1042.901 that we are making in this final rule. Each of these elements is discussed in more detail in this final rule.

¹ For engines up to 1,000 kW, compliance could be delayed for up to nine months, but no later than October 1, 2017.

The September 2019 proposed rule also included provisions related to in-use fuel sulfur standards that apply for global marine fuel. We adopted those regulatory amendments to 40 CFR part 80 in a separate rule (84 FR 69335, December 18, 2019).

The regulatory changes EPA is adopting in this final rule are largely the same as we proposed, with a few adjustments to address concerns raised by commenters. Several commenters also suggested that we broaden the scope of the rule to provide additional relief—either for a longer period or for a wider range of vessels. We are considering further rulemaking action to address these concerns, as described in Section VII.

EPA adopted emission standards for marine diesel engines under Clean Air Act authority (42 U.S.C. 7401-7671q). The amendments in this rule are covered by that same authority.

II. Background

In 2008, EPA adopted Tier 3 and Tier 4 emission standards for new marine diesel engines with per-cylinder displacement less than 30 liters (73 FR 37096, June 30, 2008). The Tier 3 standards were based on engine manufacturers' capabilities to reduce particulate matter (PM) and oxides of nitrogen (NO_x) emissions with recalibration and other engine-based technologies. The Tier 4 standards were based on achieving emission reductions through the application of catalytic aftertreatment technology, including selective catalytic reduction (SCR). These Tier 4 standards currently apply to commercial marine diesel engines with rated power at or above 600 kW. The Tier 3 standards phased in for different engine sizes and power ratings from 2009 to 2014. The Tier 4 phase-in schedule applied these more stringent standards starting in 2014 to engines at or above 2,000 kW, which are most prevalent on large workboats that are less sensitive to engine size and weight concerns. The Tier 4 standards started to apply at the start of model year 2017 for engines from 1,000 to 1,400 kW, and on October 1, 2017 for engines from

600 kW to 999 kW. The schedule for applying the Tier 4 standards was intended to give engine manufacturers time to redesign and certify compliant engines, and to give boat builders time to redesign their vessels to accommodate the Tier 4 engines.

The 600 kW threshold for applying the Tier 4 standards was intended to avoid aftertreatment-based standards for small vessels used for certain applications that were most likely to be designed for high-speed operation with very compact engine installations. Most engines above 600 kW provide power for various types of workboats and larger passenger vessels. We were aware that there would be some high-speed vessels with engines above 600 kW, but expected that engine manufacturers would be able to certify 600-1,400 kW engines and vessel manufacturers would be able to make the necessary vessel design changes during the nine-year period between the final rule and the implementation of the Tier 4 standards.

In response to the proposal preceding the 2008 final rule, some commenters recommended that the Tier 4 standards apply to engines as small as 37 kW, because small land-based nonroad diesel engines were subject to similar aftertreatment-based standards. Other commenters at that time advocated a vessel-based approach, for example exempting engines installed on patrol boats and ferries from the Tier 4 standards. However, engine manufacturers commented that a vessel-based approach would be unworkable because they would then need to certify engines for a range of vessel types. Several commenters affirmed the 600 kW threshold as appropriate, and no commenters suggested a higher threshold. As a result, EPA finalized the 600 kW threshold without further limiting the Tier 4 standards to particular types of commercial vessels.

In the intervening years, only one engine manufacturer certified Tier 4 engines below 1,400 kW, and none of those had a power density greater than 35 kW per liter total engine

displacement.² Engine manufacturers pointed to the cost of product development and certification rather than technological feasibility as the reason for delaying certification of Tier 4 engines. We also heard from manufacturers of high-speed vessels that the lack of certified Tier 4 engines with high power density was preventing them from building new vessels. Most of these concerns were related to lobster boats and pilot boats. Boat builders also told us that there would be greater challenges when installing SCR-equipped engines in these high-speed vessels.

When we adopted the Tier 4 standards in 2008, most if not all lobster boats used engines below 600 kW. Targeted lobster beds were typically located relatively close to shore. Lobster boats navigating in these areas have size and performance requirements that do not call for engines above 600 kW. Since 2008, however, it has become common to navigate to lobster beds 40 miles or farther from shore. The greater traveling distance necessitates more cargo space for a greater catch, and more speed to complete a day's work in a reasonable time. These factors caused a demand for larger vessels and more engine power, which led boat builders to install engines above 600 kW in lobster boats. Prior to the Tier 4 standards taking effect in 2017, engines for these lobster boats were subject to Tier 3 standards and thus required no aftertreatment technology. As a result, the lobster-boat engines needed for high speed and ocean navigation could fit into fiberglass hulls with minimal changes to fiberglass molds, or vessel design generally.

A complicating factor for pilot boats is other federal, state, or local programs that impose speed restrictions on vessels for certain vessel lengths. Specifically, pilot boats that operate in certain coastal areas are subject to whale-strike avoidance rules that are designed to protect migrating and calving right whales. In designated areas off the coast of Georgia, for example,

² Tier 4 engines in 2017 and 2018 were limited to Caterpillar's 32-liter and 57-liter engines.

vessels 65 feet and longer may not exceed an operating speed of 10 knots from November 1 to April 30 each year.³ The whale-strike avoidance rules increase the demand for pilot boats that are less than 65 feet long. This additional constraint further complicates the challenge to design vessels with Tier 4 engines as the SCR emission control system takes up a significant amount of already limited space. Here again, the use of Tier 4 engines will require significant boat changes and more time is needed to resolve these challenges.

These concerns led us to propose provisions to allow additional lead time for implementing the Tier 4 standards for engines used in certain high-speed vessels, and to streamline Tier 4 certification requirements. The proposal identified several vessel and engine parameters that served as criteria to limit the additional lead time to qualifying vessels, rather than naming certain vessel types.

EPA benefitted from extensive input from engine manufacturers, boat builders, and other stakeholders before publishing the proposed rule and in the comments submitted during the comment period. This information helped to clarify the constraints, capabilities, processes, and concerns for engine manufacturers, vessel manufacturers, and others affected by the Tier 4 standards.

Since the middle of 2019, four additional engine manufacturers have certified Tier 4 engines with rated power between 600 and 1,400 kW. This expands the list of Tier 4 engine models that are available to provide power for a wider range of vessel types. However, these new engine certifications and the comments received do not change EPA's concerns as stated in the proposed rule that manufacturers of vessels for certain high-speed commercial applications

³ The whale-strike avoidance rule was originally adopted by the National Marine Fisheries Service on October 10, 2008 (73 FR 60173). See 50 CFR 224.105.

continue to face important challenges associated with the availability of engines certified to the Tier 4 engine standards. These vessels have performance needs for achieving substantial propulsion power from a light-weight engine. In short, these vessel manufacturers have been unable to find certified Tier 4 engines meeting their requirements for maximum power, power density, and weight. See Section V for a more detailed discussion of the newly certified engines and the relationship to designing vessels with those Tier 4 engines.

In response to these concerns, and consistent with the proposed rule, EPA is adopting amendments to our marine diesel engine program to provide additional lead time to address these concerns for certain high-speed vessels. The new provisions allow engines installed on qualifying high-speed vessels to continue to meet Tier 3 standards during a relief period, which in turn will allow time for engine manufacturers to certify additional engine models, and for vessel manufacturers to implement design changes to their vessels to accommodate new Tier 4 engines as they become available.

The Tier 4 relief in this final rule addresses the concerns that led to the proposed rule. In particular, absent relief, boat builders would be unable to build the types of high-speed vessels identified in the proposed rule in the near term. This could result in boat purchasers sourcing new boats that are underpowered or prolonging the service life of older boats, perhaps including replacement of original engines with Tier 3 or dirtier engines. As more Tier 4 engines become available, boat builders will be able to design and build high-speed vessels that comply with Tier 4 requirements, consistent with the schedule we are specifying in this final rule. Section IV evaluates the cost and environmental impact of the relief provisions in this final rule.

Note that the new provisions allowing additional lead time for EPA's Tier 4 marine diesel engine standards are distinct from the international engine emission standards that apply under

Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL Annex VI). Because the domestic and international emission standards are adopted under different legal authorities, this rule has no bearing on the international standards. It is also the case that U.S. vessels operating only domestically are not subject to the standards adopted under MARPOL Annex VI (see 40 CFR 1043.10(a)(2)). As a result, the high-speed commercial vessels that are the subject of this rule will not be subject to emission standards under MARPOL Annex VI as long as they do not operate internationally.

III. Regulatory Changes in This Final Rule

In this rule, EPA is adopting revisions to the marine diesel engine emission control program for certain high-speed vessels and the associated engines with rated power between 600 and 1,400 kW. These changes provide more time for engine manufacturers to certify additional engine models and for vessel manufacturers to design and build boats with Tier 4 engines. We are also making changes to our certification requirements to facilitate certification, especially related to demonstrating the durability of emission controls.

The regulatory changes in this final rule are largely the same as we proposed, with a few adjustments in response to concerns raised by commenters. Several commenters also suggested that we broaden the scope of the rule to provide additional relief—either for a longer period or for a wider range of vessels. We are considering further rulemaking action to address these concerns, as noted in Section VII.

A. Adjusted Implementation Dates

EPA is revising the Tier 4 implementation dates for certain types of marine diesel engines for installation in qualifying high-speed vessels. The additional time will allow vessel manufacturers to redesign their vessels to accommodate engines with the Tier 4 technology.

Engine manufacturers have also indicated that the additional time will allow them to certify more engine models with high power density to the Tier 4 standards.

The new lead time provisions have two phases. The first phase sets model year 2022 as the Tier 4 implementation deadline for engines installed in high-speed vessels meeting a specific set of criteria. The second phase sets model year 2024 as the Tier 4 implementation deadline for engines installed in a narrower set of high-speed vessels that are facing a different set of compliance challenges.

We are applying the model year 2022 implementation date for Phase 1 relief, as proposed. This will allow boat builders time to redesign qualifying vessels to install certified Tier 4 engines. Available engines include currently certified models with total displacements of 24 and 32 liters. Engine manufacturers are also continuing to develop additional Tier 4 engine models.

The second phase addresses the different needs of manufacturers of fiberglass and other nonmetal vessels up to 50 feet long that need additional time to redesign their boats to use 600-1,000 kW engines certified to Tier 4 standards.

Boat builders and boat owners expressed a concern that the proposed additional lead time for both Phase 1 and Phase 2 was not adequate. For Phase 1, commenters requested some additional years to redesign vessels, and to find customers needing vessels during the relief period. Our intent in the proposed rule was to allow boat builders to address the dilemma of not being able to fill orders for building new boats because Tier 4 engines were not available. We did not intend, and do not support, a longer time frame that would allow boat builders to seek out expanded opportunities based on marketing the cost-saving advantages of Tier 3 compliant vessels for additional customers. The additional lead time associated with this proposed rule will

allow vessel manufacturers to reconfigure vessels, create new tooling, and start producing compliant vessels.

Commenters representing the lobstering industry described their concerns that Tier 4 standards would be more challenging and may never be appropriate for vessels meeting the Phase 2 criteria. The types of lobster boats that need engines with more than 600 kW have size and performance characteristics that are best met with 15-18 liter engines. Larger engines, especially with SCR aftertreatment, are too large and heavy to provide a suitable alternative power source for these lobster boats. We are therefore adopting the Phase 2 relief, as proposed, to allow two additional years of lead time beyond the Phase 1 criteria, and a waiver process to address the possibility that Tier 4 engines will continue to be unavailable.

Vigor, Gladding-Hearn, and Ray Hunt Design requested that EPA clarify whether they would need to take certain steps before the end of the relief period for their vessels to qualify for the additional lead time. Implementation of new emission standards is based on a combination of build dates for the engines and the vessels. For example, Phase 1 relief expires in 2021, which means that engines qualifying for relief must have a date of manufacture in model year 2021 or earlier; i.e., crankshafts must be installed in those engine blocks on or before December 31, 2021.⁴ Similarly, vessels qualify for relief only if their keels are laid on or before December 31, 2021.⁵

At the same time, however, we are concerned that boat builders may lay keels and order engines speculatively to allow them to sell Tier 3 vessels for several years beyond the relief

⁴ See the prohibition in 40 CFR 1068.101(a)(1) and the definitions of “Date of manufacture” and “Model year” in 40 CFR 1068.30.

⁵ See the prohibition in 40 CFR 1068.101(a)(1) and paragraph (8) of the definition of “Model year” in 40 CFR 1042.901.

period. This practice would be contrary to the intent of the proposed relief. The program is intended to allow boat builders to meet existing demand for certain high-speed vessels where they are currently unable to supply those vessels. To prevent building up inventories of vessels during the relief period to circumvent the Tier 4 standards, we are adopting a requirement to limit the relief to vessels for which the boat builder has a written contract from a buyer to purchase a vessel. The contract must be signed before the end of the relief period.

B. Relief Criteria

Vessels qualify for relief if they meet certain criteria, as specified in the proposal and updated for this final rule.

Both phases of relief will be available only to engines installed on high-speed vessels. High-speed vessels may generally be characterized as planing vessels based on a hull design that causes the vessel to rise up out of the water and experience lower hydrodynamic drag (with a corresponding decrease in required propulsion power) when operating at high speed. This contrasts with displacement hulls, for which propulsion power continuously increases with increasing vessel speed. Vessels with displacement hulls do not experience the same design and installation challenges compared to planing hulls. While this distinction is straightforward, there is no generally accepted way to draw a clear line between the two types of vessels. This is illustrated by “semi-planing” vessels, which have operating characteristics that fall between planing and displacement vessels. We are adopting a vessel speed criterion, as proposed, that is consistent with industry practice. We are limiting relief to high-speed vessels that have a maximum operating speed (in knots) at or above $3.0 \cdot L^{1/2}$, where L is the vessel’s waterline length, in feet. This includes an upward adjustment of about 40 percent compared to published definitions to draw a clearer line to identify high-speed vessels. As an example, 45-foot vessels

would need to have a maximum speed of at least 23 knots to qualify for relief using the specified threshold. Vessels not meeting the speed criterion either (1) are large enough to not have the same sensitivity to engine size and weight that should qualify them for relief from using Tier 4 engines or (2) do not need engines with more than 600 kW. In particular, vessels with displacement hulls that are less than 65' long generally do not have engines with rated power above 600 kW. The vessel speed criterion applies equally to both phases of adjusted implementation dates for the Tier 4 standards.

Both phases of relief will be available to both inspected and uninspected commercial vessels. This is different from our proposal, which would have limited both phases of relief provisions to vessels classified as uninspected vessels by the U.S. Coast Guard.⁶ Coast Guard designates all commercial vessels as either inspected or uninspected. Inspected vessels carry freight-for-hire or any hazardous or dangerous cargo. Towing and most passenger vessels are also inspected. In contrast, uninspected vessels include recreational vessels not engaged in trade, non-industrial fishing vessels, very small cargo vessels (less than 15 gross tons), and miscellaneous vessels such as pilot boats, patrol and other law-enforcement vessels, fire boats, and research vessels, among others. The Passenger Vessel Association, All American Marine, Gladding-Hearn, and Savannah Bar Pilots indicated that there are examples of inspected vessels that face the same issues related to engine availability and design constraints that apply for uninspected vessels. For example, pilot boats may be inspected or uninspected, depending on the owner's interest in expanding the use of a pilot boat to carrying some paying passengers. We agree that limiting relief to uninspected vessels may unnecessarily exclude some vessels for which relief was intended. We have therefore revised the final rule to remove this as a qualifying

⁶ See Title 46, Chapter I, of the Code of Federal Regulations.

criterion. This change is necessary to accomplish the goal of the intended relief. We do not think this change will significantly expand the range or number of vessels that will qualify for relief, because other engine and vessel qualifying criteria will continue to limit the number of qualifying vessels.

Vessels qualify for additional lead time based on engine characteristics in addition to the vessel characteristics described above. Qualifying engines would need to be certified to EPA's Tier 3 standards and have certain characteristics related to power density and maximum power output. Specifically, the first phase of relief is limited to propulsion engines with maximum power output up to 1,400 kW, and power density of at least 27.0 kW per liter displacement, rather than the proposed 35.0 kW per liter displacement. In addition, we are limiting relief to engines that will be installed on vessels with a waterline length up to 65 feet with total nameplate propulsion power at or below 2,800 kW (to accommodate vessels with multiple propulsion engines). The combination of the limit on maximum power for each engine with the limit on the total nameplate propulsion power has the practical effect of limiting relief to vessels with one or two propulsion engines. These criteria are intended to target relief from the Tier 4 standards for the engines and vessels identified in the proposed rule as needing additional lead time.

The second phase of relief is limited to engines that will be installed on vessels with a single propulsion engine with maximum power output up to 1,000 kW and power density of at least 35.0 kW per liter displacement, where the vessel is made with a nonmetal hull and has a maximum waterline length of 50 feet. As noted in the proposed rule, we limited Phase 2 relief to fiberglass and other nonmetal hulls because of the cost of creating new hull forms, and because there is no option for a twin-engine installation for lobster boats or similar vessels less than 50'.

Gladding-Hearn and Ray Hunt Design requested that the regulation clearly state how to determine vessel length, and suggested referencing the U.S. Coast Guard regulations at 46 CFR 175.400. We agree with these comments and are adding a regulatory definition of “waterline length” in 40 CFR 1042.901 that references the Coast Guard regulation. This includes language defining a worst-case condition representing maximum vessel loading and minimum water density. This is intended to prevent a situation in which a vessel could exceed specified length limits as a result of changing conditions.

We proposed power density criteria of 35.0 and 40.0 kW per liter displacement for Phase 1 and Phase 2, respectively. The proposed criteria were intended to focus the relief on lightweight engines needed for the affected high-speed vessels. However, boat builders expressed a concern that the proposed value might reduce the number of available Tier 3 engines to the point that the relief provisions would not allow them to build the vessels as contemplated in the proposed rule. Vigor and Savannah Bar Pilots identified 27 kW/liter as an alternative qualifying threshold to allow a wider range of engines that could be used with vessels qualifying for relief. Similarly, Gladding-Hearn and Ray Hunt Design identified 24 kW/liter as an alternative qualifying threshold. The 24 kW/liter value was based on an engine model with 57 liters total displacement, and the 27 kW/liter value was based on an engine model with 38 liters total displacement. We agree that a wider range of power density values is appropriate to accomplish the rule’s objectives and are therefore adjusting the power density thresholds for the final rule. We selected the 27 kW/liter threshold because the 38-liter engine is a viable option for vessels qualifying for Phase 1 relief, while the 57-liter engine is much too large to be a viable option for these vessels. If we consider relief for additional types of vessels in a future

rulemaking, as described in Section VII, we may reconsider the appropriate qualifying criteria for engines installed on those vessels.

These commenters suggesting lower power density thresholds made clear that weight considerations are a secondary engine parameter in designing high-speed vessels. For example, a 38-liter engine at 27 kW/liter provides about 1,100 kW of propulsion power. An engine could achieve the same power output with only 29 liters total displacement if the engine had power density at 35 kW/liter. The incremental engine weight of adding SCR to a 29-liter engine is probably less than the added weight of the larger engine without SCR. We therefore conclude that space and packaging rather than engine weight are the limiting factor in designing compliant high-speed vessels. This helps us to understand the range of engine characteristics that will be suitable for these vessels when the Tier 4 standards apply.

Table 1 summarizes the provisions we are adopting for additional lead time in this rule. This takes the form of a revised Tier 4 implementation schedule for propulsion engines with high power density.

Table 1: Summary of Qualifying Criteria for Adjusted Tier 4 Implementation Dates

Criteria ¹	Phase 1	Phase 2
Vessel speed (knots)	$> 3.0 \cdot (\text{feet})^{1/2}$	$> 3.0 \cdot (\text{feet})^{1/2}$
Engine power density	$> 27.0 \text{ kW/liter}$	$> 35.0 \text{ kW/liter}$
Engine power rating	$\leq 1,400 \text{ kW}$	$\leq 1,000 \text{ kW}$
Total vessel propulsion power	$\leq 2,800 \text{ kW}$	$\leq 1,000 \text{ kW}$
Vessel's waterline length	$\leq 65 \text{ feet}$	$\leq 50 \text{ feet}$
Vessel hull construction	Any	nonmetal
Model years for continued use of Tier 3 Engines	through 2021	through 2023

¹ The specified engine criteria apply for the Tier 3 engines installed in vessels that qualify for relief.

Only those engines and vessels that meet the criteria we are finalizing in this rule qualify for the revised Tier 4 implementation dates. An engine installed in a nonqualifying vessel, or a nonqualifying engine installed on any vessel, is subject to the prohibitions set out in 40 CFR 1068.101(a)(1) for new engines and vessels introduced into U.S. commerce, and would therefore be in violation.

In addition to the above provisions, several commenters suggested other adjustments to the proposed criteria to broaden the scope of relief. Section V includes our response to those comments.

C. Availability of Tier 3 Engines During Relief Period

Engine manufacturers will need to certify engines above 600 kW to the Tier 3 commercial standards for installation in newly constructed vessels that meet the qualifying criteria before vessel manufacturers can utilize the additional lead time provided in this final rule. Boat builders may need these Tier 3 engines very soon after we finalize this rule. To do this, engine manufacturers would generally need to restart production of engine configurations that were already certified to the Tier 3 commercial standards. Engine manufacturers may still be producing these or substantially equivalent engine configurations as certified Tier 3 recreational engines, as exempt replacement engines, or as engines for export. In most cases, engine manufacturers can resubmit information from their earlier Tier 3 application for certification to cover the new production.

Vigor, Gladding-Hearn, Ray Hunt Design, Savannah Bar Pilots, and Columbia River Pilots asked EPA to allow installation of recreational Tier 3 engines in commercial vessels during the relief period. We are not adjusting our program to allow this. Since the beginning of our emission control program for marine diesel engines, we have prohibited installation of

recreational engines in commercial vessels. Recreational engines have a much shorter useful life and therefore cannot provide reliable emission control in a commercial application. However, engine manufacturers can consider qualifying their recreational marine engines as light-commercial marine engines meeting a reduced useful life of 5,000 hours, as described in Section III.E.2. Except for that accommodation, we still find it important to disallow installation of recreational engines in commercial vessels. For manufacturers using the new provision for a reduced useful life, we will be ready to work with engine manufacturers to apply the provisions of 40 CFR 1042.245(b) to determine appropriate deterioration factors (see Section III.E.1).

Based on input received from engine manufacturers after the comment period, we expect boat builders to have several available Tier 3 engine models. Several manufacturers indicated publicly that they intend to pursue certification for Tier 3 commercial engines above 600 kW during the relief period, including Caterpillar (18-liter and 32-liter), MTU (22-liter and 27-liter) and Scania (16-liter). We are aware of additional engine manufacturers that may also pursue Tier 3 certification for engines above 600 kW.

D. Relief Through Waivers for Qualifying Engines and Vessels

EPA is adopting waiver provisions that start to apply in 2024 for vessels meeting the Phase 2 specifications described in Table 1. These waiver provisions are intended to allow boat builders to continue building boats with Tier 3 engines if engine manufacturers have not yet certified suitable engines for those vessels.

Starting in 2024, manufacturers of vessels meeting the Phase 2 qualifications described in Table 1 have the option to request that EPA approve an exemption from the Tier 4 standards. EPA will evaluate these requests based on the availability of suitable certified Tier 4 engines at the time of the request for the intended vessel design. EPA may approve requests covering

multiple vessels, but any approval will apply only for the number of vessels approved for relief. The waiver authority does not expire, so EPA would be able to continue approving manufacturers' requests to install Tier 3 engines in qualifying vessels until suitable certified Tier 4 engine models become available.

The Passenger Vessel Association, Vigor, Savannah Bar Pilots, and Columbia River Pilots suggested that the waiver process should also apply for all vessels meeting the Phase 1 qualifying criteria. As noted above, the waiver provisions are intended to allow for continued boat building in case there continue to be no suitable Tier 4 engines for the targeted vessels. In 2022 and later, we expect boat builders to be able to choose from several Tier 4 engine models between 20 and 40 liters total displacement. It will take time to modify vessel designs to accommodate Tier 4 engine technologies, but it is reasonable to expect the available Tier 4 engines to be suitable for the Phase 1 vessels. As mentioned above and described in Section VII, we are considering a separate rulemaking proposal to address remaining questions about the availability of Tier 4 engines for other types of high-speed vessels where there may not yet be suitable Tier 4 engines.

EMA stated that they do not support extending Tier 4 relief for a longer period than we proposed. They specifically objected to specifying 2028 as the year for applying the Tier 4 standards for Phase 2 relief based on engine manufacturers' need to start selling Tier 4 engines to recover their development costs. They also expressed a concern that waiver provisions could be disruptive for product planning if the waiver approval would not be well defined or if it extended more than one year beyond the adjusted starting date of the Tier 4 standards. We agree that adding several years of lead time would not be an effective way to support the engine manufacturers' development and certification programs for Tier 4 engines. The waiver process is

preferable because it allows us to limit relief in 2024 and later to cases in which there are no suitable engines certified to the Tier 4 standards. For example, engine manufacturers have not committed to certifying Tier 4 engines below 20 liters, and if that is still the case and raised in a request for a waiver, it may be appropriate not to limit a waiver to a single year beyond the adjusted start date for the Tier 4 standards. Conversely, if an engine manufacturer certifies an engine model that is suitable for powering vessels that would otherwise meet the specified Phase 2 criteria, it would be appropriate to deny the waiver request. The waiver provisions spell out the approval criteria needed for EPA to evaluate any future requests for relief; the approval process with the approval criteria adequately define the terms of the waiver to avoid arbitrary decision-making that would be disruptive for engine manufacturers and their product planning.

E. Revised Certification Requirements

Engine manufacturers told us that one of the biggest factors delaying their plans to certify Tier 4 engines in the 600 to 1,400 kW power range is the expected low sales volumes that make it harder to recover the investment needed to develop marine-specific calibrations and perform the testing needed to certify engines under 40 CFR part 1042. We understand engine manufacturers' concerns to recover their investment in designing and certifying compliant engines. The market for compliant engines is expected to grow as more engines are needed internationally to comply with the stringent emission standards adopted for NOx Emission Control Areas under MARPOL Annex VI. Manufacturers are also expected to redesign their engines to comply with the stringent marine diesel engine emission requirements for vessels operating on inland waterways in Europe. The stringency of the European standards is similar to EPA's Tier 4 standards for NOx emissions and is more stringent for PM emissions. These

standards will therefore contribute to further development and installation of advanced emission controls.

To facilitate certification of engines meeting the EPA Tier 4 standards, we are adopting revised engine certification requirements aimed at reducing engine manufacturer compliance and certification costs for the affected engines. These provisions are intended to help accelerate the market entry of additional Tier 4 marine engines, and additional power ratings for engines already certified to Tier 4 standards.

1. Deterioration Factors

We are adopting a temporary provision allowing engine manufacturers to certify specific engines to Tier 4 standards based on assigned deterioration factors. Engine manufacturers rely on deterioration factors so they can test a new engine and adjust the test results mathematically to represent emission levels at full useful life. Before this rule, the regulations for certifying marine diesel engines have allowed assigned deterioration factors only for small-volume engine manufacturers and post-manufacture marinizers. Assigned deterioration factors reduce the cost and time to certify to Tier 4 standards, which could accelerate the schedule for certifying, and may lead manufacturers to decide to pursue Tier 4 certification in light of the expected low sales volumes for recovering the associated development costs.

To encourage development of additional engine options for high-speed vessels, we will allow assigned deterioration factors for engines with power density above 30.0 kW/liter displacement. This applies through 2024 for 1,000 – 1,400 kW engines, and through model year 2026 for 600 – 1,000 kW engines. These dates are set to apply for the first three years after the Tier 4 standards start to apply on the adjusted schedule, with the expectation that engine

manufacturers could accumulate information on the durability characteristics of engines during those three model years before needing to develop family-specific deterioration factors.

The proposal specified that assigned deterioration factors would be available for two years for engines with power density above 35.0 kW/liter. Engine manufacturers' comments requested that we allow assigned deterioration factors down to 30.0 kW/liter, and for a year longer than we proposed. They suggested the changes to ensure that the amended provisions would together create the appropriate reduction in development costs needed to achieve the objective of getting additional engines certified to the Tier 4 standards. We had selected the proposed thresholds for power density mostly to prevent adverse competitive effects for manufacturers that had already certified to Tier 4 standards. We realize, however, that even those manufacturers with certified engines can benefit from the new flexibility for certifying additional engine families.

We have reviewed available data to support default values for assigned deterioration factors. The deterioration factors are multiplicative values of 1.1 for NO_x and 1.4 for HC and CO, and an additive value of 0.003 g/kW-hr for PM.⁷ These are the same values specified for the proposed rule. Where an individual engine manufacturer has existing data available, such as from certified land-based versions of its marine engines, EPA would consider that information, consistent with 40 CFR 1042.245(b), and may adjust the value of one or more default assigned deterioration factors accordingly.

Engine manufacturers would need to certify using family-specific deterioration factors in the first model year after the assigned deterioration factors are no longer available.

⁷ "Technical Analysis for Amendments Related to Marine Diesel Engine Emission Standards," EPA memorandum from Cheryl Caffrey to Docket EPA-HQ-OAR-2018-0638, August 1, 2019.

Manufacturers could determine new deterioration factors from a conventional durability demonstration based on emission measurements before and after an extended period of service accumulation in the laboratory.

The proposal included a request for comment to allow at-sea emission measurement in addition to lab-based measurement to establish deterioration factors. We contemplated this change in the context of engine manufacturers' interest in an alternative to the conventional durability demonstration. In their comments, engine manufacturers did not support changing the program to require deterioration factors based on emission measurement for engines installed in vessels. We will not adopt this as a requirement. With respect to alternative durability demonstration, we note that 40 CFR 1042.245(b) allows manufacturers to determine deterioration factors using an engineering analysis based on emission measurements from highway or nonroad engines that are similar to the marine engine being certified.

2. Reduced Regulatory Useful Life for Light Commercial Engines

We proposed to reduce the useful life from 10,000 hours to 5,000 hours for commercial marine engines that have power density above 50.0 kW/liter displacement. There are currently no engines certified to Tier 4 standards with power density above 44 kW per liter. We acknowledge that increasing an engine's power rating comes from higher intake air pressures and greater fuel flow into the engine, which can cause some engine and aftertreatment components to wear out sooner. Engines with lower power density are designed for continuous operation for very long periods with minimal downtime. Engines with high power density are inherently lighter weight for a given power rating and have a shorter time before scheduled rebuilding. Under our current regulations, the same regulatory useful life applies for commercial engines without regard to power density. However, the performance demands associated with

high power density make it more difficult to demonstrate that engines with aftertreatment technology will meet Tier 4 standards over the full regulatory useful life.

Vigor and Savannah Bar Pilots supported the proposal to adopt a shorter useful life for engines with high power density as a way to increase the number of certified engines, but stated that 40 kW/liter would be the appropriate qualifying threshold. The Truck and Engine Manufacturers Association also supported adopting a shorter useful life, but stopped short of making a recommendation on the threshold that should apply.

We are adopting a shorter regulatory useful life for commercial engines above 600 kW with very high power density as proposed, except that the qualifying threshold is 45.0 kW/liter (see §1042.145). If manufacturers opt for the shorter useful life for qualifying engines, we consider those to be “light-commercial marine engines” (see §1042.901). The newly certified 24-liter engine from MAN meets the Tier 4 standards for a useful life of 10,000 hours at a top rating of about 44 kW/liter. This engine serves as an important benchmark for decision-making about the limits of a 10,000 hour useful life in an engine with very high power density. First, the engine demonstrates the feasibility of meeting the Tier 4 standards for 10,000 hours. Second, it demonstrates the feasibility limits of meeting Tier 4 standards over a useful life of 10,000 hours. MAN makes this same engine with higher power ratings for recreational applications. We therefore understand 44 kW/liter to be the upper bound for meeting the Tier 4 standards without a reduced useful life. Setting the threshold at 45.0 kW/liter creates an incentive for other manufacturers to pursue engine certification for higher-output light-commercial ratings to create additional power alternatives for boat builders that need to meet the most demanding performance specifications.

The reduced useful life for light-commercial engines also applies for Tier 3 engines with maximum power above 600 kW, consistent with the proposed rule. This may increase the number of engine models available during the relief period to the extent that engine manufacturers certify recreational engine models for light-commercial applications. The Truck and Engine Manufacturers Association commented asking that we specify the shorter useful life also for Tier 3 engines below 600 kW. However, there are several such engine models currently certified to the Tier 3 standards over a useful life of 10,000 hours with power density between 45 and 55 kW/liter. As a result, allowing engines less than 600 kW to qualify for a shorter useful life would relax the stringency of standards that manufacturers are already meeting. We are therefore not reducing the useful life for engines below 600 kW.

Manufacturers certifying engines to Tier 4 standards using a reduced useful life can use assigned deterioration factors as described in Section III.E.1. In the proposal, we considered adjusting the values of the assigned deterioration factors to account for the shorter useful life. However, this final rule applies the same assigned deterioration factors for the shorter useful life, because we expect those engines to experience the same amount of wear and degradation in 5,000 hours that other engines would experience in 10,000 hours.

3. Engine Duty Cycle for Certification Testing

Engine manufacturers certify their engines to the relevant emission standards by measuring emissions at test points on the applicable duty cycle specified in 40 CFR 1042.505 and contained in Appendix II of 40 CFR part 1042, and summing the weight-adjusted emission results. As described in 40 CFR 1042.505(b)(1) and (2), commercial propulsion engines with fixed-pitch propellers are tested on the 4-mode E3 duty cycle, and recreational engines are tested on the 5-mode E5 duty cycle. While engine speed and power at the test modes are substantially

the same for both duty cycles, the E5 duty cycle has an extra test point at idle and also includes different weighting to calculate overall emissions. These duty cycles are intended to represent in-use operation for the different applications: commercial engines are expected to operate more time at 75% load and above while doing work (engaged in commercial activity) while recreational engines are expected to operate at high load only occasionally. Recreational engines have much less operation overall, and they spend more time at idle and low engine loads.

Table 2 reproduces the speed and power settings for the E3 and E5 duty cycles.

Table 2: Speed and Power Settings for the ISO E3 and E5 Duty Cycles

Mode No.	Engine Speed	Percent of maximum test power	E3 weighting factors	E5 weighting factors
1	Maximum test speed	100 %	0.20	0.08
2	91 %	75 %	0.50	0.13
3	80 %	50 %	0.15	0.17
4	63 %	25 %	0.15	0.32
5	Warm idle	0 %	—	0.30

In response to EPA's request for comment on duty cycles, engine manufacturers asked that EPA allow the option of using the E5 duty cycle to certify commercial marine diesel engines with power density above 30.0 kW/liter. Engines above 30 kW/liter may be used in applications that are more like high-speed recreational boats (e.g., planing boats) than low-speed commercial boats (e.g., river boats). We agree with engine manufacturers that this change is appropriate. We are therefore amending 40 CFR 1042.505 to allow manufacturers to certify engines above 30.0 kW/liter using the E5 duty cycle. The reasons for this change are the same as the reasons supporting the reduced useful life revision described above. These engines are likely to be operated in a way more reflective of the E5 duty cycle, particularly those installed on planing or

semi-planing vessels like lobster boats or pilot boats. The option to certify engines above 30.0 kW/liter applies equally to Tier 3 and Tier 4 engines.

As noted above, engines with power density above 45.0 kW/liter may certify with a reduced useful life of 5,000 hours. These engines are inherently limited to installation in vessels whose operation is shifted toward light-load operation. We are therefore requiring engines to be certified using the E5 duty cycle if they have the shorter useful life. This may require development of engine calibrations and control strategies optimized to maintain low NO_x emissions at idle and low-load operation to ensure that in-use engines will control emissions as effectively as the prototype engine tested for certification.

We will not require testing with both E3 and E5 duty cycles for any engine families certified to EPA standards under 40 CFR part 1042. However, to simplify dual certification to both our Clean Air Act marine diesel engine standards and MARPOL Annex VI Regulation 13 NO_x limits, manufacturers may submit test data from both duty cycles. The reported data would need to show that engines meet emission standards over each duty cycle.

These changes to the program will not require new testing for engines that are already certified to our Tier 3 or Tier 4 standards, and certification based on the E3 duty cycle will continue to be valid for demonstrating compliance with standards for any engines certified to a useful life of 10,000 hours.

IV. Economic and Environmental Impacts

The economic impact, emission inventory, and human health and welfare assessments performed for this final rule use the same methodologies as were used for the proposal. The inventory and costs assessments rely on the data and methodologies developed to support our 2008 Final Rule. The benefits assessment uses a simplified health benefits estimation method.

The results of these analyses are set out in a technical memorandum prepared for this rule,⁸ are summarized below, and are contained in Table 3 below. The Technical memorandum also contains the Executive Order 13771, Reducing Regulation and Controlling Regulatory Costs analysis prepared for this rule.

Consistent with the economic impact analysis prepared for EPA's 2008 rulemaking, the costs for this final rule were estimated using both a behavioral approach (in the intermediate-run after the adoption of new standards, producers pass only some compliance through to consumers), and a full-cost pass-through approach (in the long-run after the adoption of new standards, producers pass all compliance costs through to consumers). This rule imposes no additional economic costs above those included in our 2008 rulemaking. Instead, the additional lead time is expected to result in cost savings. We estimate cost reductions of about \$3.9 million, using a behavioral modeling approach, or \$4.2 million, using a full-cost pass-through approach (2015\$). These are the estimated cost reductions from installing less expensive Tier 3 engines in new vessels during the relief period (2020 through 2023) and the associated operating cost reductions during the 13-year lifetime of those engines (2020 through 2035).

With respect to emission inventory impacts, this rule changes the implementation date of the Tier 4 standards for qualifying engines and vessels, which will delay the emission and air quality benefits of those standards. The estimated annual increase in NO_x and PM₁₀⁹ emissions associated with the relief is about 108 and 2.3 short tons, respectively, in 2020 and 2021, when

⁸ See "Final Assessment Analysis: Amendments Related to Marine Diesel Engine Emission Standards," EPA memorandum from Jean Marie Revelt, EPA, Kenneth Davidson, PS, and Margaret Zawacki, EE, to Docket EPA-HQ-OAR-2018-0638, August 12, 2020.

⁹ Consistent with the 2008 Rule, this inventory analysis is for PM₁₀. In the 2008 rule, PM_{2.5} was estimated at 97% of PM₁₀.

both sets of engines are affected, decreasing to 37 and 1 ton, respectively, in 2022 and 2023, when only those engine up to 1,000 kW engines are affected. The lifetime inventory increase is estimated to be about 3,764 tons of NOx and 79 tons of PM10, assuming a 13-year lifetime. This represents less than one-tenth of one percent of the national annual emissions for these pollutants from commercial Category 1 marine diesel engines (i.e., engines below 7.0 liters per cylinder displacement).

The estimated impacts on emissions and costs presented in Table 3 do not include the use of waivers. If engine manufacturers apply for and receive waivers post-2023, the estimated cost reductions and emission inventory impacts would increase and would extend for a longer period of time (the useful life of the engines produced subject to the waiver).

Table 3: Estimated Impacts on Emissions and Costs

Year	Affected Engines per Year	NOx Increase per year (short tons)	PM10 Increase per year (short tons)	Compliance Cost Reduction (2005\$)*	Operating Cost Reduction (2005\$)
2020	25	108.1	2.3	\$455,667 to \$531,177	\$36,000
2021	25	216.3	4.6	\$455,913 to \$531,689	\$72,000
2022	21	252.9	5.3	\$301,749 to \$359,562	\$102,240
2023	21	289.5	6.1	\$301,686 to \$359,499	\$132,480
2024	0	289.5	6.1	0	\$132,480
Lifetime Impacts (sum of 2020-2035)	92	3,764	79.2	\$3.2 to \$3.5 million (2005\$) (\$3.9 to \$4.2 million 2015\$)	

* Costs were modeled in 2005\$; lifetime impacts were converted in the final step of the analysis. Lower value of costs impacts estimated with a behavioral modeling approach, upper value estimated with a full-cost pass-through modeling approach. See “Assessment Analysis: Final Marine CI Tier 4 Rule,” EPA memorandum from Jean Marie Revelt, to Docket EPA-HQ-OAR-2018-0638 for details.

These forgone emission reductions are associated with forgone improvements in human health. Using reduced form health benefit per-ton values,¹⁰ we estimate that the annual PM_{2.5}-related forgone benefits do not exceed a high-end estimate of \$3.0 million in any given year (2015\$, 3% discount rate, mortality effect estimate derived from Lepeule et al., 2012). The total present value of the stream of forgone benefits ranges from \$9.8 million to \$31 million.

Reduced form tools, by their nature, are subject to uncertainty.¹¹ In addition to the uncertainties present across the entire emissions-to-impact modeling pathway, it is important to note that the monetized benefit per ton estimates used here reflect the geographic patterns of the underlying emissions and air quality modeling assumptions used to create the reduced form health benefit per ton values. Those assumptions do not necessarily reflect the conditions of the policy scenario in which they are applied, which can lead to an over- or underestimate of benefits. In this rule, for example, the forgone benefits may be overstated in a location like Maine, because there will be some transport of emissions offshore or to areas external to the United States with different population and geographic characteristics. See the Final Assessment Analysis prepared for this rule for additional discussion regarding reduced form benefit per ton values.¹²

¹⁰ PM_{2.5}-related health benefits are estimated by applying sector-specific (C1/C2 marine vessel engine) benefit per ton values for NO_x and directly-emitted PM_{2.5} using a source apportionment approach that is similar to what has been used in past EPA analyses. See: Wolfe, P., Davidson, K. Fulcher, C., Fann, N., Zawacki, M., Baker, K.R. (2018). Monetized health benefits attributable to mobile source emission reductions across the United States in 2025. STOTEN, 650 (2019) 2490-2498, September.

¹¹ See EPA (2018). Technical Support Document: Estimating the Benefit per Ton of Reducing PM_{2.5} Precursors from 17 Sectors. Office of Air and Radiation, Office of Air Quality Planning and Standards, Research Triangle Park, February.

¹² See “Final Assessment Analysis: Amendments Related to Marine Diesel Engine Emission Standards,” EPA memorandum from Jean Marie Revelt, EPS, Kenneth Davidson, PS, and Margaret Zawacki, EE, to Docket EPA-HQ-OAR-2018-0638, August 12, 2020.

V. Response to Comments

As described in Section II, the proposed rule focused on providing relief for specific applications where limited engine availability may be preventing boat builders from making certain types of high-speed vessels. The proposed rule accordingly described regulatory amendments to allow additional lead time only for certain types of vessels, based on several engine-related and vessel-related qualifying criteria.

Section III describes the regulatory amendments for this final rule and addresses comments that relate directly to those provisions. This Section V addresses comments that apply more generally, or that are outside the scope of the proposed rule.

A. Commenters Generally Supporting the Rule

The Truck and Engine Manufacturers Association (EMA) and multiple state organizations commented in support of the proposed rule to provide Tier 4 relief for certain high-speed vessels. Maritime Partners stated that they did not oppose the proposed rule. Each of these comments also noted that EPA should not expand the relief beyond what was proposed.

In line with these comments, we are taking the approach of finalizing the narrowly crafted relief from the proposed rule. Section III describes how we made several minor adjustments following the proposal. For example, the final rule—

- Includes vessels that are subject to Coast Guard inspections as qualifying for relief
- Allows boat builders to build vessels qualifying for relief based on a less challenging requirement for minimum power density
- Specifies a lower power density to qualify for a reduced useful life for certifying Tier 4 “light-commercial” engines
- Adds an option to certify certain commercial engines with the E5 duty cycle that previously was used only for certifying recreational engines.

Each of these minor modifications from the proposal is intended to ensure that the relief provisions will accomplish the intended objective.

B. Commenters Wanting to Expand the Scope of Relief for High-Speed Vessels

Several boat builders and boat operators suggested that we broaden the scope of the rule to provide additional relief for a wider range of high-speed vessels for which certified Tier 4 engines were not available. This included general recommendations to allow relief for all high-speed vessels longer than 65' and for all emergency-response vessels (or all publicly owned vessels). Some commenters also described the need for relief for very specific applications, such as hovercraft and catamarans with certain characteristics. Commenters also advocated for allowing Phase 2 relief for vessels with metal hulls.

To prepare the proposed rule, we did an in-depth investigation of information, perspectives, constraints, and prospects for developments related to the vessels and engines that we identified in the proposed rule. That led us to carefully construct the qualifying criteria to allow relief where the need was evident, and to disallow relief where we expected vessel manufacturers to have access to Tier 4 engines that were suitable for those applications. We also used available information to determine the appropriate duration of the relief period and to quantify the economic and environmental impacts of providing relief for qualifying vessels and engines. The result was the proposed arrangement of Phase 1 and Phase 2 qualifying criteria and the corresponding schedule for delaying implementation of the Tier 4 standards.

It is appropriate to focus this final rule on solving the problems that were the basis of the proposed rule. This will allow us to quickly finalize the relief for the vessels targeted in the proposed rule. Repeating the process of defining qualifying criteria and setting an appropriately revised implementation schedule for additional vessel types would require additional information gathering and stakeholder outreach.

Commenters raised several concerns about boat builders' ability to find and install Tier 4 engines in certain types of vessels. As described in Section VII, we are not adopting relief in this rule to address these concerns, but we are rather intending to further investigate the need for additional relief. If we pursue additional relief for certain types of vessels, this would be in the form of a new proposal that would consider the comments we received in the context of this rule.

A similar assessment applies for the comments describing a need for lobster boats to be permanently excluded from Tier 4 requirements. We are adopting the Phase 2 relief consistent with the proposed rule to address what we know about concerns for building boats with Tier 4 engines. In any subsequent proposal, we would also consider revisiting the decision in this rule to require installation of Tier 4 engines in lobster boats and other vessels meeting the Phase 2 criteria starting in 2024.

C. Commenters Opposed to the Rule

Some commenters objected to providing any relief from the Tier 4 standards. We address each of these comments in the following sections based on the main arguments presented.

1. General Issues

The American Lung Association (ALA) and an anonymous commenter stated that EPA should keep the Tier 4 standards as adopted to realize the important environmental gains from improved emission control. They argued that manufacturers have had enough time to produce compliant engines and vessels, and that EPA should not revise the rules to reduce costs to industry. MAN objected to EPA providing relief based on the increased cost of Tier 4 engines in light of their understanding that certifying engines to Tier 4 standards did not involve unreasonable costs.

Regarding ALA's comments on the forgone environmental benefits, we quantified the estimated environmental impacts of this rule using the methods and data we used in our 2008 final rule; see Section IV. Allowing boat builders to use Tier 4 engines for a longer phase-in period is expected to increase annual in NO_x and PM₁₀¹³ emissions by about 108 and 2.3 short tons, respectively, in 2020 and 2021, when both sets of engines are affected, decreasing to 37 and 1 ton, respectively, in 2022 and 2023, when only engines 600-1,000 kW are affected. EPA talked with several boat builders who indicated that they simply cannot build boats at this time because certified Tier 4 engines in the necessary power range are unavailable. This means that at least some part of the fleet of commercial boats with high power density engines is prevented from turning over to cleaner Tier 4 engines, and that in at least some of these cases unregulated engines or Tier 1 or Tier 2 engines with higher emission levels will continue to operate in the fleet. While it is not possible to know how many of these previous-tier vessels are not being replaced, it is reasonable to observe that replacing these boats with new boats powered by Tier 3 engines is preferable to having the older vessels continue in the fleet. This is because the older vessels that need to be replaced are likely to have engines that pre-date the Tier 3 standards: Tier 2 or, even more likely, pre-control engines. As such, these vessels are likely to have much higher emissions than vessels powered by Tier 3 engines. Replacing these vessels with vessels powered by Tier 3 engines would reduce air emissions from the sector.

Regarding MAN's comment on costs, the basis for the proposed changes to the program was to respond to the concerns of boat builders that they could not build new boats due to the non-availability of compliant engines. EPA was aware of the challenges of certifying 600-1400

¹³ Consistent with the 2008 Rule, this inventory analysis is for PM₁₀. In the 2008 rule, PM_{2.5} was estimated at 97% of PM₁₀.

kW engines when we adopted the 2008 rule, which was the basis for allowing the greatest lead time for these engines. It is straightforward to conclude that boat builders have not been able to build the identified types of vessels because engine manufacturers had not produced many of the same engine models in a Tier 4 configuration that they had previously produced in a Tier 3 configuration for use in these vessel types.

EPA notes that MAN has recently certified a 24-liter engine with high power density for use in commercial boat applications, and that some additional lead time will be necessary for vessel builders to incorporate this engine into their designs. We anticipate that further developments in certifying additional engine models to Tier 4 standards will make it possible to eventually realize most or all of the anticipated emission reductions anticipated in the 2008 rule.

2. Availability of Suitable Tier 4 Engines

MAN objected to EPA acknowledging widespread use of SCR in marine applications, and then providing relief based on SCR not being available for marine engines. More specifically, MAN argued that they and other manufacturers have certified a range of Tier 4 engines that provide suitable power options for the vessels EPA identified as needing relief. MAN emphasized that EPA's relief provisions would prevent them from being able to sell their Tier 4 engines after investing substantially to certify their engines.

EPA was not suggesting that SCR is not an appropriate technology for marine engines. However, boat builders need engine manufacturers to develop properly sized compliant engines and certify them to Tier 4 standards before they do the necessary design work to install those engines into their vessels. In this rule, EPA is responding to the engine manufacturers' delayed schedule for certifying Tier 4 engines. Specifically, before the Tier 4 standards went into effect in 2017, engine manufacturers offered several marine diesel engine models for use in a wide

variety of commercial boats. However, when the Tier 4 standards went into effect, the market was characterized by the absence of certified engines. For whatever reason, engine manufacturers chose not to carry out the development programs necessary to apply SCR or other Tier 4 technology to these smaller engines and to certify those engines in large enough quantities to maintain this section of the marine diesel market. Our decision to propose relief was accordingly based on the availability of certified engines, not on a judgment as to whether SCR is an inappropriate technology for marine installations.

Engine manufacturers have now certified 20-liter, 24-liter and 32-liter engines to the Tier 4 standards (Table 4 identifies the Tier 4 engines that are available). Currently certified Tier 4 engines larger than 32-liter reach high power density only for ratings well above 1,400 kW. We anticipate that engine manufacturers will certify additional engine models with different displacements and power ratings in the years ahead. The 65' pilot boat that Savannah Bar Pilots want to build illustrates the need for relief. Vigor, the boat builder for Savannah Bar Pilots, commented that this boat would not meet performance specifications related to speed and annual operating hours with 24-liter engines. Previous designs for this type of vessel included a pair of 32-liter engines, which may give an appropriate balance of power, weight, and durability, but 32-liter engines with aftertreatment and associated hardware would require the boat builder to substantially redesign the vessel. Boat builders need time to make those changes to be able to build a boat that meets performance specifications with the Tier 4 engine configuration. In recognition that additional certified Tier 4 engines are now becoming available for consideration by boat builders, EPA is providing only temporary, limited relief from the Tier 4 standards.

Table 4: Currently Certified Tier 4 Engines Below 1400 kW

Manufacturer	Displacement (liters)	Maximum Power (kW)	Power Density (kW/liter)
--------------	--------------------------	-----------------------	-----------------------------

Yanmar	20.4	670-749	33-37
MAN	24.2L	746-1,066	31-44
Baudouin	32.1L	900-1,215	28-38
Caterpillar	32L	746-1,082	23-35
Mitsubishi	49L	940	19
Caterpillar	57.6L	1,000-1,772	17-31

3. Vessel Redesign for Lobster Boats

MAN described their 24-liter engine as being a suitable option for lobster boats if boat builders make a reasonable effort to redesign vessels to account for the additional size and heat rejection associated with exhaust aftertreatment.

We have learned that a full-size lobster boat is normally 45-50' long with a single 16-18 liter engine that has a power rating of 700-750 kW. These Tier 4 engines with exhaust aftertreatment will require boat builders to substantially redesign their vessels just to make room for a larger engine package. That would be a considerable challenge with 16-18 liter engines. Boat builders would not be able to install the larger 24-liter engine with exhaust aftertreatment in these vessels without extensive structural changes. The vessel redesign would also need to address concerns about higher engine room temperatures, water reversion that could damage SCR catalysts, and storing Diesel Exhaust Fluid (DEF), among other things. Boat builders may be able to redesign their vessels to address all these concerns, but they need to have clear specifications from the engine manufacturers before they undertake such redesign and, in any event, are not likely to be able to successfully accomplish this for building boats in 2023 or earlier. They may even need more lead time than we are adopting in this rule. This is the basis to allow for the possibility that boat builders will not be able to install Tier 4 engines in 2024 and later model years by providing the waiver provisions discussed in Section III.D.

It should be noted that some lobster boat builders (and boat purchasers), faced with a requirement to install Tier 4 engines, may choose instead to build a boat with a smaller engine certified to Tier 3 standards. Other boat owners may choose to keep their older boats running instead of buying new boats with Tier 4 engines, and possibly repowering with previous tier engines when needed.¹⁴ The purpose of the relief provisions we are adopting in this rule is to avoid these unintended consequences by giving engine manufacturers more time to address the power needs for high-speed vessels while allowing boat builders to continue to build boats with Tier 3 engines in the interim. To the extent these unintended consequences would play out in the marketplace in the absence of this rulemaking, there could be associated cost and emission impacts in the absence of this rulemaking. However, these costs are unclear and EPA's impacts assessment described in Section IV only models costs and disbenefits directly related to this rule.

4. DEF availability

MAN commented that DEF is widely available and EPA should therefore not extend compliance deadlines based on limited access to DEF.

As described above, the proposed relief is based on the limited availability of certified Tier 4 engines suitable for use in certain high-speed vessels. Some commenters advocated for relief from Tier 4 emission standards based on limited access to DEF, but DEF supply and infrastructure were not considered in the proposed rule. These issues are therefore outside the scope of this rule.

D. River Towing

The American Waterways Operators and some of its members commented on the proposed rule to suggest that river pushboats also needed additional time to comply with Tier 4

¹⁴ See EPA-HQ-OAR-2018-0638-0054 and EPA-HQ-OAR-2018-0638-0055.

standards. Commenters mainly cited reliability concerns for Tier 4 engines operating in a river environment (i.e., operating at high load when pushing against the river current, low load when operating with the river current), the challenge of redesigning this type of vessel to use Tier 4 engines, the additional complexity of operating and maintaining Tier 4 engines with advanced electronic controls and aftertreatment, the limited available Tier 4 engine models, and access to diesel exhaust fluid on inland rivers. They also expressed concerns about the aggregate costs of purchasing, installing, and using Tier 4 engines.

These comments contrasted with those from Maritime Partners, who said that engine manufacturers and multiple boat builders are actively engaged with substantial investments to design and build river pushboats with Tier 4 engines.

We did not propose to make any changes to the Tier 4 standards or implementation schedule for river pushboats and are therefore not in a position to adopt relief provisions for those vessels in this rule. We may take further action to address these concerns in any follow-on action we consider as described in Section VII.

E. Replacement Engines

Gladding-Hearn Shipbuilding and the Passenger Vessel Association requested that we revise the regulation to allow vessel owners to replace old engines under the replacement engine exemption under 40 CFR 1068.240, but keep the old engine as a spare to minimize downtime in anticipation of an emergency engine failure. The commenters stated that such an engine failure without a spare engine could be economically devastating.

These commenters are describing “swing” engines. EPA clarified our approach to swing engines in our 2008 rulemaking in response to the concerns of commenters on that rule (73 FR

37158, June 30, 2008). Some ship owners said that they currently use swing engines in their regular operations and that the application of our replacement engine provisions would prevent them from continuing this practice. In our 2008 rule, we clarified that we allow swing engines as a maintenance practice when the swing engines are additional engines purchased at the time the vessel is constructed and are clearly intended to be part of an engine maintenance strategy for that vessel. In a qualifying swing engine fleet, when one of the vessel's engines is due for rebuild, it is removed from the vessel and replaced with an engine from the swing engine group. The removed engine is rebuilt and then becomes the next swing engine. The swing engine must be the same emission tier as the original engine on the vessel, and it is subject to EPA's marine diesel engine remanufacturing requirements when it is rebuilt. Note that if a swing engine is replaced with a new engine, both engines are subject to the engine replacement provisions in 40 CFR 1042.615 and 1068.240.

The commenters are requesting that they be allowed to designate an engine as a swing engine at the time the engine is replaced, by retaining the rebuilt original engine, thus exempting the engine from the provisions for new replacement engines. We disagree with this request, as it undermines the purpose of the replacement engine provisions in our marine diesel engine program. Currently, if an owner installs a new replacement engine, the new engine must meet the most stringent tier of standards feasible for installation on a boat.¹⁵ Thus, a new replacement engine for a vessel built in 1995 would need to meet at least Tier 3, unless it can be established that a Tier 3 engine cannot be used in the vessel because of the physical or performance needs of

¹⁵ As stated in 40 CFR 1042.615, EPA has determined that engines certified to Tier 4 standards do not have the appropriate physical or performance characteristics to replace uncertified engines or engines certified to emission standards that are less stringent than the Tier 4 standards.

the vessel, at which point a Tier 2 engine must be considered, and then a Tier 1 engine. Because new replacement engines prolong the life of older vessels and delay the turnover of the fleet to cleaner engines, this requirement is an important means of making incremental improvements in emission controls from the marine fleet.

In the context of swing engines, if an engine in the fleet experiences engine failure, the owner would remove the failed engine, install the swing engine, and use the exemption for new replacement engines to become the next swing engine. This would require returning the failed engine to the engine manufacturer as a core exchange. The engine manufacturer may restore the failed engine to a working condition and resell it, subject to the conditions that apply under 40 CFR 1068.240. The regulation does not allow the owner to retain ownership of the original engine after it has been replaced with an exempted engine under 40 CFR 1068.240, even if it could otherwise be rebuilt for use as a swing engine.

Note that if the owner is replacing the old engine with a used engine, rather than a new engine, the only regulatory constraint is that the replacement engine may not be certified to a lesser tier of standards than the engine it is replacing (see 40 CFR 1068.120). However, that used engine may be subject to EPA's marine diesel engine remanufacture program when it is rebuilt (see 40 CFR part 1042, subpart I).

These comments on replacement engines are outside the scope of the proposed rule. However, we want to take the opportunity to emphasize that EPA's swing engine program is well established and that the Agency has no plans to revise those regulatory provisions.

F. Other Comments

State groups submitted comments stating that EPA would need to adopt alternative control measures to make up for forgone emission reductions that are already in state plans for meeting air quality standards. We originally adopted emission standards for marine diesel engines to comply with our Clean Air Act authority to set emission standards requiring the greatest achievable degree of emission control. The relief provisions we are adopting are based on this same assessment of what is feasible. We will consider every opportunity to require emission reductions from marine diesel engines and other sectors, but emissions accounting does not change our assessment of what boat builders can do to comply with the Tier 4 standards.

The National Association of Clean Air Agencies (NACAA) encouraged us to prioritize and take action to establish more stringent marine emission standards for engines below 600 kW, and to consider adopting emission standards that harmonize with more stringent standards that apply outside the United States where possible. Our 2008 final rule described the challenges associated with applying Tier 4 standards to commercial marine engines below 600 kW and the boats that use them and, to our knowledge, these challenges have not been resolved. EPA does not have plans to revisit those emission standards at this time; however, we will continue to evaluate whether or when it is appropriate to apply more stringent emission standards for engines below 600 kW. Similarly, we will continue to evaluate whether or when it is appropriate to adopt more stringent emission standards that would allow engine manufacturers to make a single low-emission engine that simultaneously complies with emission standards adopted by multiple regulating agencies.

EMA commented that dedicated direct-drive fire pumps should be permanently exempted from Tier 4 standards because their use is limited to emergency operations (plus limited

maintenance and testing). EMA provided no detailed justification for not meeting Tier 4 standards and provided no information that would help us assess the economic or environmental impacts of such a change to the regulation. This comment is outside the scope of this rulemaking. We are not taking action in this final rule to address the request.

NACAA recommended that we provide a more geographically resolved estimation of the lost emission reductions, at least on the regional level. We have concluded that it is not possible to provide a more geographically resolved estimation of the forgone emission reductions without knowing the precise location of the boats that take advantage of the additional lead time. As explained in the economic and environmental impacts analysis prepared for this rule, we estimate that if all the annual emissions for the 600 – 1,000 kW engines are attributed to Maine, the forgone emissions from Tier 4 relief would amount to about 0.4 percent and 0.1 percent of those state-wide NO_x and PM₁₀ emissions, respectively. Similarly, if all the annual emissions for 600 – 1,000 kW engines are attributed to Georgia, the forgone emissions from Tier 4 relief would amount to about 0.13 percent and 0.03 percent of those state-wide NO_x and PM₁₀ emissions, respectively.¹⁶

VI. Regulatory Alternatives

The proposed rule described the basis for pursuing additional lead time for meeting Tier 4 requirements for certain engines and vessels where it was apparent that there was no feasible path for compliance. The relief provisions in this rule are narrowly crafted to address the concerns communicated by boat builders leading up to the proposed rule. These provisions

¹⁶ See “Final Assessment Analysis: Amendments Related to Marine Diesel Engine Emission Standards,” EPA memorandum from Jean Marie Revelt, EPA, Kenneth Davidson, PS, and Margaret Zawacki, EE, to Docket EPA-HQ-OAR-2018-0638, August 12, 2020.

include a waiver process for vessels meeting the Phase 2 criteria as described in Section III.B for 2024 and beyond. In the proposal, we also requested comment on an alternative approach of adopting a new Tier 4 start date of 2028 for vessels meeting the Phase 2 criteria.

As described in Section V, adding several years of lead time would not be an effective way to support the engine manufacturers' development and certification programs for Tier 4 engines. The waiver process is preferable because it allows us to limit relief in 2024 and later to cases in which there are no suitable engines certified to the Tier 4 standards. If an engine manufacturer certifies an engine model that is suitable for powering vessels that would otherwise meet the specified Phase 2 criteria, it would be appropriate to deny the waiver request.

We have calculated the emission impacts associated with an alternative 2028 Tier 4 start date for vessels meeting the Phase 2 criteria.¹⁷ Adopting this regulatory alternative would have increased the estimated total forgone inventory benefits of the proposal by about 1,760 additional short tons of NOx and 37 additional short tons of PM10 above the estimated inventory increases associated with the final program adopted in this final rule. Using reduced form health benefit per ton values, we estimate that the annual PM2.5-related forgone benefits for this regulatory alternative could be up to a high-end estimate of \$4.4 million in any given year (2015\$, 3% discount rate, mortality effect estimate derived from Lepeule et al., 2012). The total present value of the stream of forgone benefits ranges from \$13.5 million to \$44.6 million. The estimated cost savings would increase by \$3.3 million, using a behavioral modeling approach, or \$3.6 million, using a full-cost, pass-through approach (2015\$), over the estimated cost savings associated with the final adopted program.

¹⁷ See "Final Assessment Analysis: Amendments Related to Marine Diesel Engine Emission Standards," EPA memorandum from Jean Marie Revelt, EPA, Kenneth Davidson, PS, and Margaret Zawacki, EE, to Docket EPA-HQ-OAR-2018-0638, August 12, 2020.

VII. Plans for Further Action

In response to our proposal, we received several comments from industry stakeholders who indicated that relief is also needed for other vessel types. These include catamarans, hovercraft, some types of emergency response boats, and push boats. Specifically, hovercraft have design specifications for lifting the vessel up out of the water that require engines to fall into a narrow range of power, size, and weight. Similarly, catamarans with hydrofoils need to use light-weight components and materials to achieve the lift necessary to operate properly. Also, fire boats and other emergency response vessels sometimes need to achieve very high speeds, which in turn requires very compact and light-weight engines with very high power output. For these and similar applications, boat builders indicated that they may not be able to move ahead with new construction with available Tier 4 engines.

The issues raised by these commenters are complex. It will take some time to carefully consider an appropriate policy direction and, if necessary, prepare a new proposal with specific additional relief provisions. Rather than delay the relief as described in the proposed rule, we will consider the issues raised by these stakeholders separately. As a result, we will continue to consider whether and how to formulate Tier 4 relief provisions for these vessels. We will be reaching out to stakeholders to better understand their concerns and determine whether we can develop a set of narrow qualifying criteria to allow relief where it is needed while continuing to require installation of Tier 4 engines where relief is not needed. The appropriate measure for evaluating the need for relief is whether certified Tier 4 engines will be available with the appropriate power characteristics to meet performance specifications, after accounting for reasonable measures to redesign vessels to account for engines with exhaust aftertreatment.

In this future assessment, we will need to take into consideration currently certified engines and the efforts that engine manufacturers intend to make to certify relevant engines in the foreseeable future. We will need to carefully assess the expected range of available engines, both to determine which vessels warrant relief and to determine how long the relief period should be.

Finally, we will also consider whether further changes to certification requirements are necessary to encourage greater availability of relevant engines. This is of particular concern for engines with total displacement below 20 liters, where the absence of Tier 4 certified engines is most pronounced. In our assessment, we will also consider the progress that engine manufacturers have made toward certifying marine diesel engines to the IMO Tier III or EU Stage V standards. Our assessment may also include consideration of adjusting NO_x, HC, CO, or PM standards, revising the durability testing provisions for certification, and expanding the scope of Tier 4 to apply to engines below 600 kW.

In any future action, we would also consider whether to make further regulatory changes to address the request for a long-term and sustainable set of requirements for lobster boats and similarly affected vessels.

As described in Section V, some operators of river boats continue to be concerned about complying with Tier 4 requirements. These concerns are very different than those that apply to installing Tier 4 engines in high-speed vessels. Rather, boat builders and operators will need time to work out design, installation, and operational issues with newly configured engines in a river environment. We will continue to monitor progress toward compliance for river pushboats that are subject to Tier 4 requirements. We will also learn, along with the industry, how Tier 4

compliance requirements are affecting the ability of operators to safely and effectively deliver products on the inland waterway system.

VIII. Statutory and Executive Order Reviews

Additional information about these statutes and Executive Orders can be found at <http://www2.epa.gov/laws-regulations/laws-and-executive-orders>.

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563:

Improving Regulation and Regulatory Review

This is a significant regulatory action that was submitted to the Office of Management and Budget (OMB) for review. Any changes made in response to OMB recommendations have been documented in the docket.

B. Executive Order 13771: Reducing Regulations and Controlling Regulatory Costs

This action is considered an Executive Order 13771 deregulatory action. Details on the estimated cost savings of this final rule can be found in EPA's analysis of the projected costs and benefits associated with this action.

C. Paperwork Reduction Act (PRA)

The information collection activities in this rule have been submitted for approval to the Office of Management and Budget (OMB) under the PRA. The Information Collection Request (ICR) document that the EPA prepared has been assigned EPA ICR number 2602.02. You can find a copy of the ICR in the docket for this rule, and it is briefly summarized here. The information collection requirements are not enforceable until OMB approves them. OMB has previously approved the information collection activities related to marine diesel engine emission standards in 40 CFR part 1042 under OMB control number 2060-0287.

Information collection is limited to manufacturers of qualifying high-speed vessels requesting a waiver from the Tier 4 standards after the standards restart in model year 2024. We are adopting this as a precaution, in case engine certification and further technology development for installing Tier 4 engines does not allow for complying with standards in 2024. We will protect confidential business information as described in 40 CFR part 2.

Respondents/affected entities: Manufacturers of high-speed vessels.

Respondent's obligation to respond: Response is required to get EPA's approval for a waiver from Tier 4 standards.

Estimated number of respondents: 0

Frequency of response: There are no recurring responses.

Total estimated burden: 0 hours (per year). Burden is defined at 5 CFR 1320.3(b).

Total estimated cost: \$0 per year, including \$0 per year in annualized capital or operation & maintenance costs.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for the EPA's regulations in 40 CFR are listed in 40 CFR part 9.

D. Regulatory Flexibility Act (RFA)

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. In making this determination, the impact of concern is any significant adverse economic impact on small entities. An agency may certify that a rule will not have a significant economic impact on a substantial number of small entities if the rule relieves regulatory burden, has no net burden, or otherwise has a positive economic effect on the small entities subject to the rule. This rule is expected to provide regulatory flexibility to small

owners and operators of U.S. vessels. We have therefore concluded that this action will have no net regulatory burden for any directly regulated small entities.

E. Unfunded Mandates Reform Act (UMRA)

This action does not contain any unfunded mandate as described in UMRA, 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments. The action imposes no enforceable duty on any state, local, or tribal governments or the private sector.

F. Executive Order 13132: Federalism

This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.

G. Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

This action does not have tribal implications as specified in Executive Order 13175. This rule will be implemented at the Federal level and affects owners and operators of U.S. vessels. Thus, Executive Order 13175 does not apply to this action.

H. Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks

This action is not subject to Executive Order 13045 because it is not economically significant as defined in Executive Order 12866, and because the EPA does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. This action's health and risk assessments are described in Section IV.

I. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

This action is not a “significant energy action” because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. This action provides relief from current emission standards for a small number of vessels and streamlines the process for certifying engines. None of these changes are expected to significantly affect energy supply, distribution, or use. Section IV describes how we expect this rule to have a small overall environmental impact.

J. National Technology Transfer and Advancement Act (NTTAA)

This rulemaking does not involve technical standards.

K. Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations, and Low-Income Populations

This action does not have disproportionately high and adverse human health or environmental effects on minority populations, low-income populations or indigenous peoples, as specified in Executive Order 12898 (59 FR 7629, February 16, 1994). Section IV describes how this action will have a very small impact on all populations.

L. Congressional Review Act (CRA)

This action is subject to the CRA, and EPA will submit a rule report to each House of the Congress and to the Comptroller General of the United States. This action is not a “major rule” as defined by 5 U.S.C. 804(2).

List of Subjects in 40 CFR Part 1042

Environmental protection, Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Labeling, Penalties, Reporting and recordkeeping requirements, Vessels, Warranties.

Andrew Wheeler,

Administrator.

For the reasons set forth above, EPA amends 40 CFR part 1042 as follows:

**PART 1042—CONTROL OF EMISSIONS FROM NEW AND IN-USE MARINE
COMPRESSION-IGNITION ENGINES AND VESSELS**

1. The authority citation for part 1042 continues to read as follows:

Authority: 42 U.S.C. 7401-7671q.

2. Section 1042.145 is amended by adding paragraphs (k) through (o) to read as follows:

§1042.145 Interim provisions.

* * * * *

(k) *Adjusted implementation dates for Tier 4 standards.* Engines and vessels may qualify for delaying the Tier 4 standards specified in §1042.101 as follows:

(1) The delay is limited to model year 2021 and earlier engines and vessels that meet all the following characteristics:

(i) Category 1 propulsion engines with specific power density above 27.0 kW/liter, up to maximum engine power of 1,400 kW.

(ii) Vessels have total propulsion power at or below 2,800 kW.

(iii) Vessel waterline length is at or below 65 feet.

(iv) Vessels have a maximum speed (in knots) at or above $3.0 \cdot L^{1/2}$, where L is the vessel's waterline length, in feet.

(2) The delay also applies through model year 2023 for engines and vessels that meet all the following characteristics:

(i) Category 1 propulsion engines with specific power density above 35.0 kW/liter, up to maximum engine power of 1,000 kW.

(ii) Vessels have total propulsion power at or below 1,000 kW.

(iii) Vessel waterline length is at or below 50 feet.

(iv) Vessels have a maximum speed (in knots) at or above $3.0 \cdot L^{1/2}$, where L is the vessel's waterline length, in feet.

(v) Vessels have fiberglass or other nonmetal hulls.

(3) Vessel manufacturers must have a contract or purchase agreement signed before the end of the relief period for each vessel produced under this paragraph (k).

(4) Affected engines must instead be certified to the appropriate Tier 3 emission standards specified in §1042.101. Engine manufacturers may include engine configurations with maximum engine power below 600 kW in the same engine family even if the power density is below the value specified in paragraph (k)(1) or (2) of this section.

(5) If you introduce an engine into U.S. commerce under this section, you must meet the labeling requirements in §1042.135, but add the following statement instead of the compliance statement in §1042.135(c)(10):

THIS MARINE ENGINE COMPLIES WITH U.S. EPA TIER 3 EMISSION
STANDARDS UNDER 40 CFR 1042.145(k). ANY OTHER INSTALLATION OR USE
OF THIS ENGINE MAY BE A VIOLATION OF FEDERAL LAW SUBJECT TO
CIVIL PENALTY.

(l) [Reserved]

(m) *Tier 4 waiver*. Starting with model year 2024, vessel manufacturers may request an exemption from the Tier 4 standards as follows:

(1) The subject vessels and engines must meet the qualifications of paragraph (k)(2) of this section.

(2) Vessel manufacturers must send a written request for the exemption to the Designated Compliance Officer. The request must describe efforts taken to identify available engines certified to the Tier 4 standards, describe design efforts for installing engines in the subject vessels, identify the number of vessels needing exempt engines, demonstrate that the vessel cannot meet essential performance specifications using available Tier 4 engines, and state that engine and vessel manufacturers will meet all the terms and conditions that apply. We may approve an exemption from the Tier 4 standards based on the submitted information.

(3) Engine manufacturers may ship exempt engines under this paragraph (m) only after receiving a written request from a vessel manufacturer who has received our written approval to build a specific number of vessels. The prohibitions in 40 CFR 1068.101(a)(1) do not apply to a new engine that is subject to Tier 4 standards, subject to the following conditions:

(i) The engine meets the appropriate Tier 3 emission standards in §1042.101 consistent with the provisions specified in 40 CFR 1068.265.

(ii) The engine is installed on a vessel consistent with the conditions of this paragraph (m).

(iii) The engine meets the labeling requirements in §1042.135, with the following statement instead of the compliance statement in §1042.135(c)(10):

THIS MARINE ENGINE DOES NOT COMPLY WITH CURRENT U.S. EPA
EMISSION STANDARDS UNDER 40 CFR 1042.145(m). ANY OTHER
INSTALLATION OR USE OF THIS ENGINE MAY BE A VIOLATION OF
FEDERAL LAW SUBJECT TO CIVIL PENALTY.

(n) *Assigned deterioration factors.* Engine manufacturers may use assigned deterioration factors for certifying Tier 4 engines with maximum power up to 1,400 kW, as follows:

(1) For engine families that have at least one configuration with maximum engine power at or below 1,400 kW and power density above 30.0 kW/liter, you may use assigned deterioration factors through model year 2024.

(2) For engine families that have at least one configuration with maximum engine power at or below 1,000 kW and power density above 30.0 kW/liter, you may use assigned deterioration factors through model year 2026.

(3) The assigned deterioration factors are multiplicative values of 1.1 for NO_x and 1.4 for HC and CO, and an additive value of 0.003 g/kW-hr for PM, unless we approve your request to use different values. We will approve your proposed values if we determine based on data from similar engines and supporting rationale you submit with your request that they better represent your engines.

(o) *Useful life for light-commercial engines.* You may certify commercial Category 1 engines at or above 600 kW with power density above 45.00 kW/liter to the exhaust emission standards of this part over a full useful life of 10 years or 5,000 hours of operation instead of the useful-life values specified in §1042.101(e). Engines certified to this shorter useful life must be in their own engine family.

3. Section 1042.505 is amended by revising paragraphs (b) introductory text and (b)(2) to read as follows:

§ 1042.505 Testing engines using discrete-mode or ramped-modal duty cycles.

* * * * *

(b) Measure emissions by testing the engine on a dynamometer with the following duty cycles (as specified) to determine whether it meets the emission standards in § 1042.101 or § 1042.104:

* * * * *

(2) *Duty cycle for engines with high power density.* Except as specified in paragraph (b)(3) of this section, use the 5-mode duty cycle or the corresponding ramped-modal cycle described in paragraph (b) of Appendix II of this part for light-commercial engines and recreational marine engines with maximum engine power at or above 37 kW. You may also use this duty cycle for other commercial engines instead of the duty cycle specified in paragraph (b)(1) of this section if the power density for every configuration in an engine family is above 30.0 kW/liter.

* * * * *

4. Section 1042.901 is amended by adding definitions in alphabetical order for “Light-commercial marine engine” and “Waterline length” to read as follows:

§1042.901 Definitions.

* * * * *

Light-commercial marine engine means a Category 1 propulsion marine engine at or above 600 kW with power density above 45.0 kW/liter that is certified with a shorter useful life based on its high power density.

* * * * *

Waterline length means the horizontal distance measured between perpendiculars taken at the forwardmost and aftermost points on the waterline corresponding to the deepest operating draft (see “Length between perpendiculars” at 46 CFR 175.400). This applies for a worst-case combination of a fully loaded vessel in freshwater in summer.

* * * * *